JOURNAL OF ELECTRICITY

POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

Entered as second class matter May 7, 1906, at the Post Office at San Francisco, Cal., under the act of Congress March 3, 1879.

VOL. XXXVII NO. 25 SAN FRANCISCO, DECEMBER 16, 1916 PER COPY, 25 CENTS

AMERICA'S ELECTRICAL WEEK ON THE PACIFIC COAST.

A NEW METHOD FOR THE MEASUREMENT OF THE DIELECTRIC CONSTANT.

BY J. PARKER VAN ZANDT.

THE SINUSOIDAL WAVE METHOD OF RADIO TELEGRAPHY.

BY WALTER HAYNES.

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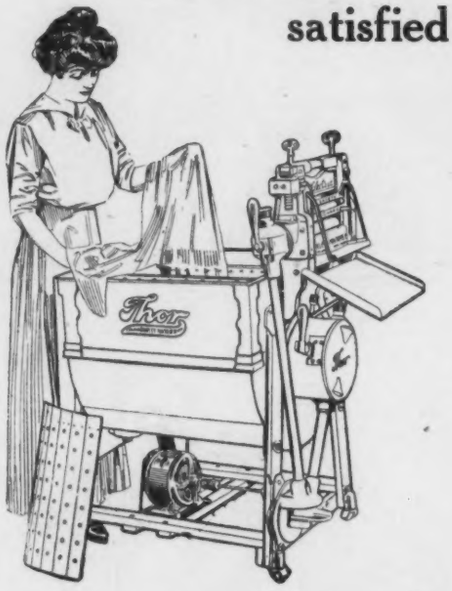

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JOURNAL OF ELECTRICITY
POWER AND GAS
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VOLUME XXXVII SAN FRANCISCO, DECEMBER 16, 1916 NUMBER 25

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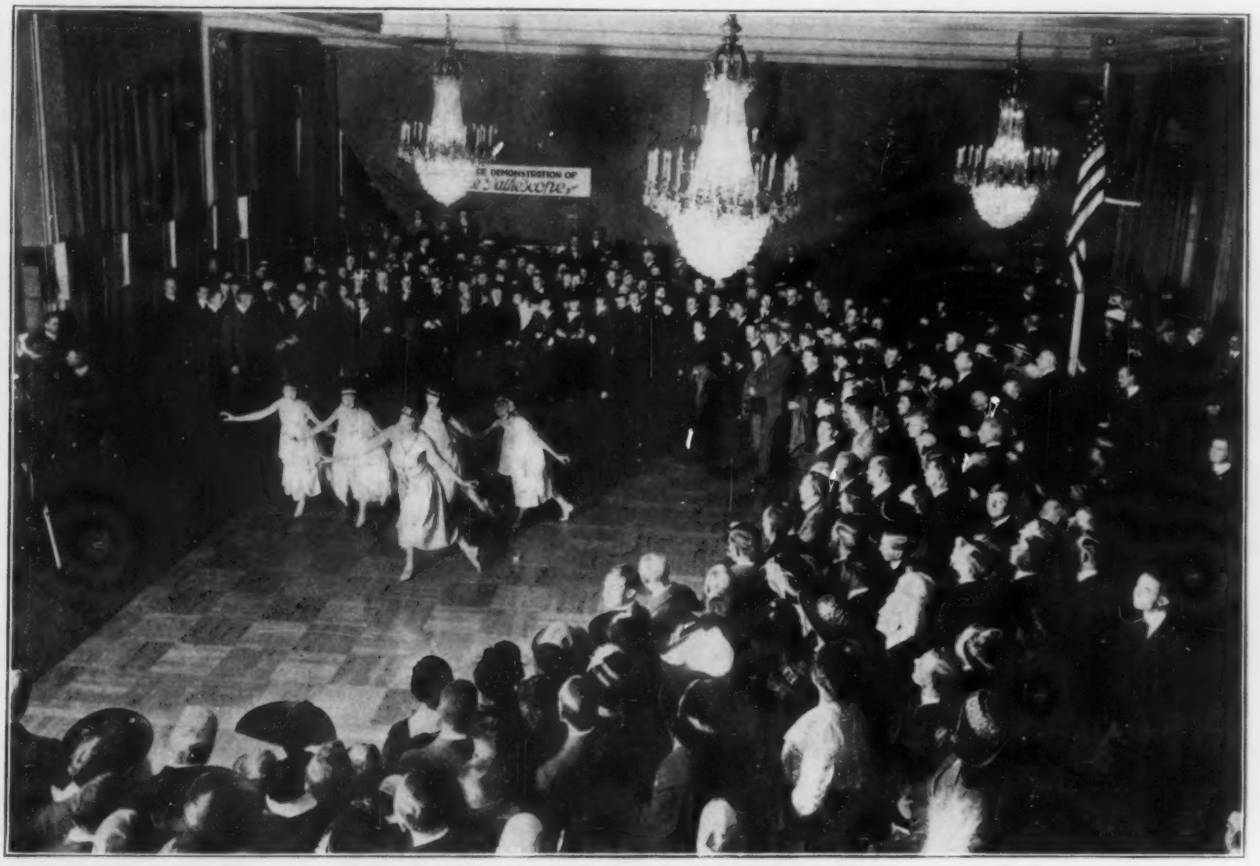
AMERICA'S ELECTRICAL WEEK ON THE PACIFIC COAST

America's Electrical Week will go down in history as the greatest single sales campaign ever conducted on the Pacific Coast. From Seattle on the north to San Diego on the south, from San Francisco in the west to Salt Lake City in the east, collective energy and enthusiasm produced unhoped for results.

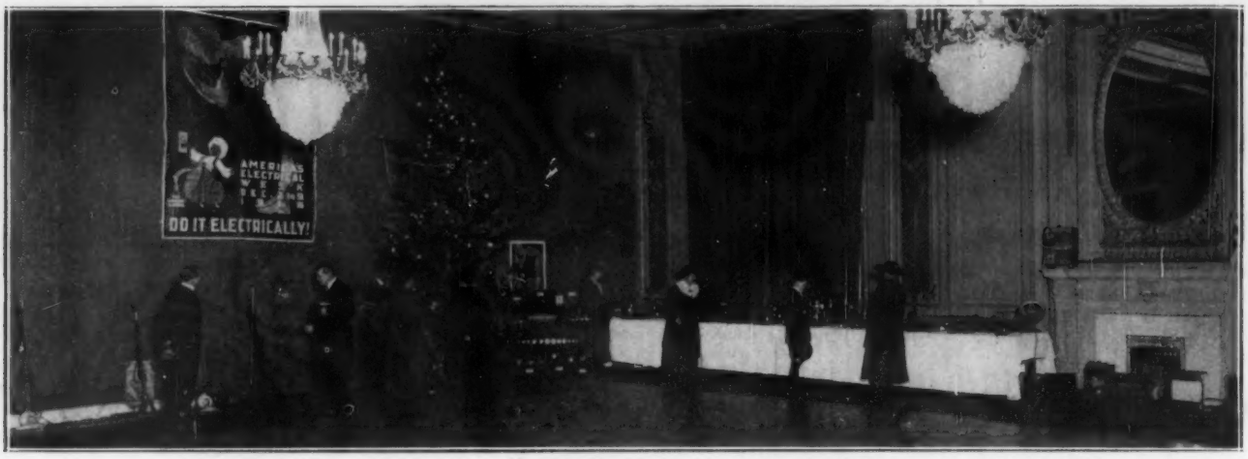
These results have materialized directly in a tremendous stimulation in the sale of electrical devices and indirectly in an enhanced appreciation of the value of central station electric service. The people bought appliances and are using them with a clearer understanding of all the tremendous investment and care which stands behind the electric button which the modern Aladdin presses to summon the great genii Electricity.

It is as yet too soon to give detailed figures of sales increase. For the present it is sufficient to record what was done in each community to attract attention, induce interest and develop desire to "do it electrically."



Crowd at San Francisco Electric Show Opening Night.

In general, the favorite attraction was the electric show. Co-operative newspaper advertising, billboard displays, street car cards, and special invitations brought throngs of visitors. Luncheon meetings addressed by prominent electrical leaders were popular. The schools were reached by special lecturers and the



Vacuum Cleaner, Flashlight, Table Appliance and Glow Stove Exhibit at San Francisco.

women's clubs by demonstrations. Every electrical dealer in the West put forth special efforts in providing window displays and store demonstrations. Tons of literature and poster stamps were distributed by the central stations.

San Francisco's Activities.

The most comprehensive campaign was conducted in San Francisco. Two weeks before the opening of the week sixty-eight 24 sheet billboards were up throughout the city. These carried the Aladdin poster together with a message "celebrate Christmas electrically" which will continue to remind the shopper of the value of electrical gifts until the 20th of December.

On Thanksgiving day 1300 announcements of the electric show appeared in the cars of the United Railroads and the "week" was ushered in by electrical pages in the newspapers.

The show consisted of a select exhibit of electrical household appliances attractively displayed in the beautiful ballroom of the Palace Hotel. It was officially opened on Saturday night, December 2, under the auspices of the Electrical Development and Jovian League by the Hon. Frank Devlin, member of the Railroad Commission of the State of California. After an appropriate introduction by R. E. Fisher, vice-president of the League, Mr. Devlin told of the marvellous accomplishments of electricity and turned the switch controlling the special illumination features.

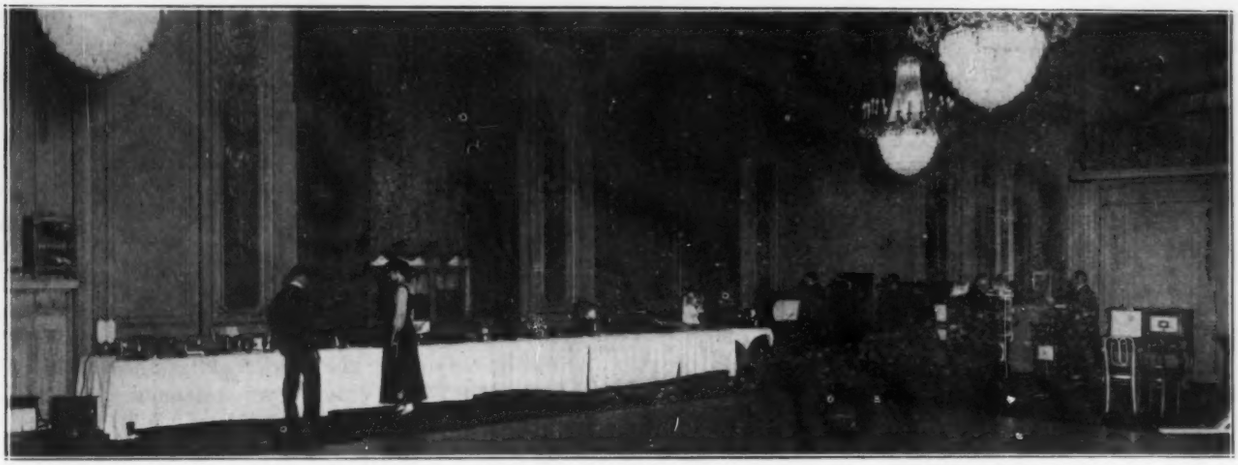
First of these was a beautiful American flag which was unfurled to the breeze of electric fans and floodlighted while the hall was in darkness. A squad from the National Guard raised the flag and sounded reveille. The effect of the inspiring spectacle on the 1500 men and women in the audience was remarkable. Patriotism was aroused in every breast and the full meaning of America's Electrical Week realized. An electrically lighted Christmas tree also burst into radiance at the same time. A group of dancing girls entertained the crowd during the rest of the evening while the guests themselves were not dancing.

Each evening throughout the following week was in charge of some one of the affiliated electrical organizations. On Monday night the electrical contractors were hosts, on Tuesday the United Railroads, on Thursday the electrical manufacturers, on Friday the Pacific Telephone & Telegraph Company and on Saturday the central stations. Special entertainment was provided in each case.

Electrical luncheons were also held in the hall throughout the week. On Monday the Electrical Development and Jovian League turned out an attendance of 150 members.

On Tuesday the Rotary Club to the number of 241 were the guests of the eleven electrical members who had provided special displays of their own products for the occasion. Geo. C. Holberton, manager of the San Francisco district of the Pacific Gas & Electric Company, was the honorary chairman and W. S. Coleman of Pacific Service the presiding officer. After a brief address on the Significance of America's Electrical Week by A. H. Halloran, managing-editor of the Journal of Electricity, as Pacific Coast representative of the Society for Electrical Development, Mr. Coleman read joking telegrams introducing the electrical Rotarians, R. M. Alvord of the General Electric Co., Clyde Chamblin of the California Electric Construction Co., D. E. Harris of the Pacific States Electric Co., John Hepburn of the California Electric Construction Co., Jos. Hutchison of the Novelty Electric Sign Co., Samuel Ickelheimer, dealer in electrical fixtures, J. C. Manchester of the Interstate Electric Novelty Co. (who also distributed Franco flashlights to all present), Chas. E. Thatcher of the Western Union Telegraph Co., and Jos. Thieben of the Panama Lamp Co., each telling briefly the good points of his product. Mr. Holberton then introduced Dr. Thomas Addison, Pacific Coast manager of the General Electric Company, who gave a masterly address on "Paths of Electric Progress." This address briefly reviewed the recent accomplishment of the electrical art, lamps, railways, generators, transmission, ship propulsion, and railway electrification, together with a forecast of the future, concluding with statistics regarding California's electrical pre-eminence.

On Tuesday, also, the electrical men were the guests at a joint luncheon of the Chamber of Commerce and Commercial Club, where 300 men listened to talks by F. J. Koster and A. B. C. Dohrmann. Mr. Koster emphasized the growth of the electrical industry and bespoke fair treatment of the power companies. Mr. Dohrmann illustrated the possibilities of cooperative publictiy and education of business men in



Lamp Socket Devices and Electric Ranges at San Francisco Exhibit.

better business methods by means of the work being accomplished by the Society for Electrical Development.

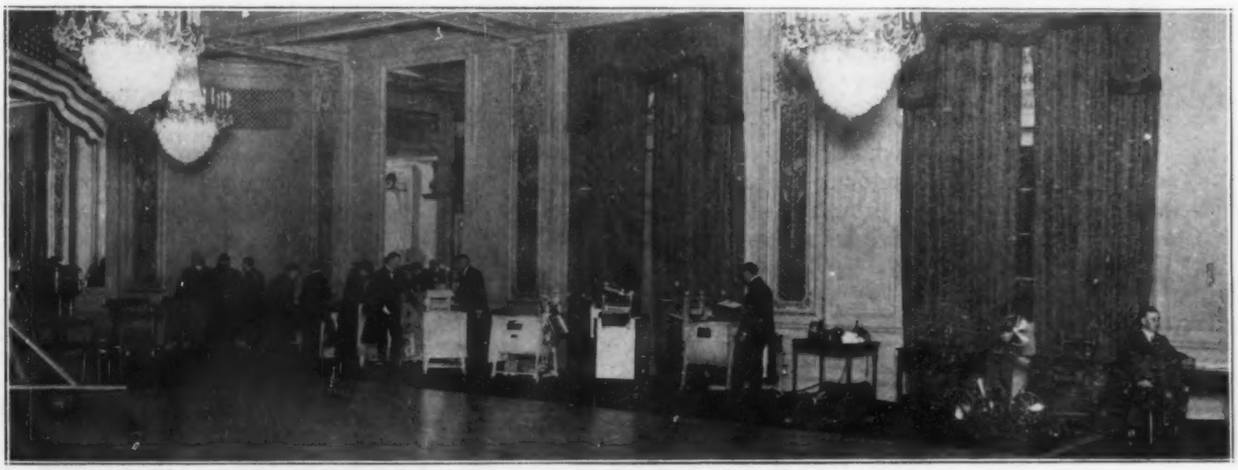
A joint meeting of the Downtown Association and Ad Club in the ballroom of the Palace Hotel on Wednesday was addressed by Mr. Geo. C. Holberton of the Pacific Gas & Electric Co. on the subject "What Stands Behind the Electric Switch." On Thursday Mr. Albert H. Elliott, secretary of the Pacific Coast Jobbers' Association gave an eloquent address on the "Electrical Conquest of the World," before the Home Industry League, this meeting also being held in the Palace Hotel ballroom, with an attendance of 175 members. Mr. Elliott's talk was much the same as reported in the activities at Sacramento.

The show was planned as a strictly educational, non-competitive exhibit of electrical devices. The exhibits were installed by the manufacturers and jobbers, no dealer participating directly in the show All appliances were grouped as to kind, i.e. all ranges of different makes were at one end of the hall, all vacuum cleaners at the other, etc. No special display signs were allowed and the only literature distributed was a classified catalogue of exhibits giving the names of dealers from whom the apparatus might be purchased. A large Federal electric sign in the hotel lobby directed visitors to the ballroom. Moving pictures of electrical subjects were shown together with a special exhibit by the Pathescope. A conservative estimate shows that an average of 2850 people visited the show daily, giving a total of more than 17,000 during the six days that the exhibit was open to the public.

During the week John Varney of the Pacific Gas & Electric Company, Waldo Cole of the Westinghouse Electric & Manufacturing Co., and Henry Holland of the Great Western Power Co. lectured in the high schools before over 2000 students, driving their arguments home by means of moving pictures.

Aside from the credit due to the members of the general committee having the arrangements in charge, special mention should be made of the work of the committee of arrangements, consisting of S. V. Walton, F. H. Leggett, E. B. Strong, R. M. Alvord and P. C Butte as well as of the efforts of the finance committee, T. E. Bibbins, F. H. Leggett and C. E. Heise. R. E. Fisher had charge of the electric show, M. S. Orrick acted as general chairman of the entertainment committee, L. E. Voyer erected the electric flag, F. S. Myrtle handled the publicity, the American Ever Ready Co. furnished the Christmas tree. Particular thanks is due to the United Railroads of San Francisco for many privileges extended and to the San Francisco newspapers for their liberality with space. A. H. Halloran managed the entire campaign.

All interests have expressed themselves as extremely well satisfied with the results. The campaign



Ranges, Washing Machines and Sewing Machines at San Francisco Exhibit.

greatly exceeded that of last year because of the wide publicity given. Plans are already being laid for a similar campaign in 1917 with a much more comprehensive electric show as the big drawing card.

Celebration at Oakland.

A well-arranged and well-attended electric show at Fourteenth and Webster streets represented Oakland's participation in America's Electrical Week. Placards in the street cars and notices in the newspapers sufficed to bring a large and interested crowd. In addition four street cars were fitted with electric signs calling attention to the week's activities.

The show was held in a vacant store at a prominent corner close to the center of the city. The participants were the dealers of the city, each of whom equipped a typical room electrically. The living-room was furnished by Spott Bros., with table lamp, glowers, Victrola, electric piano, Christmas tree and vacuum cleaner. The Pacific Coast Specialty Company had charge of the dining-room, in which was displayed a complete line of table appliances, an air heater and a vacuum cleaner. The bedroom was equipped by the Oakland Electric Company, with water heater, curling irons, warming pads and air heater. The kitchen was furnished by the Kimball Electric Company, with a range, ovenette and cleaner, and the laundry by the Piedmont Electric Company, with washing machine, ironer, dish washer and flatirons.

Additional exhibits were made by the Berkeley Electric Construction Company and Spott Bros., consisting of heating appliances, sewing machines, electroliers, Junior ranges, grills, telephones and hot plates. The Electrical Construction Company showed a switchboard, the Conrad Electric & Motor Company a full display of small motors, the Pacific Telephone & Telegraph Company a private branch exchange and a telephone booth, the Maxwell Hardware Company portable lamps and vacuum cleaner, Rauch & Lang a worm gear drive, and Gray & Son a washing machine and scales.

A large electric sign on the roof, a brilliant lamp display and electrical toys in the windows were effective features in attracting attention. Meetings of the Rotary Club and the manufacturers' bureau of the Chamber of Commerce were also addressed by Frank Leach and E. O. Shreve, respectively.

Under the direction of Chairman F. H. Woodward, Henry Mellman acted as chairman of the exhibit committee, Geo. Furniss of the finance committee, Norman Ellis of the furnishing committee (John Breuner Co. supplying all furniture), and E. C. Wilson in charge of decorations and securing exhibitors.

Tacoma's Participation.

Tacoma participated in America's Electrical Week with an electric show, which proved a success both from the viewpoint of the exhibitors and as an educational proposition, as shown by the large crowds attending the show. This was Tacoma's first electric show, but from present indications would seem that it should be a yearly event. The show was held in a building which already housed a permanent manufacturers' and jobbers' exhibit, the electrical exhibits being placed in all the available vacant spaces. On Wednesday, December 6th, a special electrically cooked luncheon was served to the women's clubs of the city. Twenty-four-sheet billboards were displayed throughout the city, consisting of two Modern Aladdin posters on either side of an eight-sheet poster. "See what's new. America's Electrical Week, December 2-9, Tacoma Building. Everybody invited. No admission fee."

Aberdeen's Show.

Aberdeen, Wash., celebrated the week by holding an "Electric Show," giving $20 in cash prizes for best essays from the grammar and high school grades on "Electricity in Everyday Life," and offering special prices and free lamps to all placing an order for wiring an old house during the week. The "show" went very successfully. The essay contest caused a tremendous interest among the school children. The housewiring scheme did not bring results very fast, but was nevertheless worth the effort.

The "show" was held in a big, vacant storeroom in the best downtown business section. A large flag in front of the building, five large flood lights on tops of buildings across the street, an arch of eleven 1000 watt type C mazdas across the street in front, a big sign painted "Electric Show. Do It Electrically" focused attention on the show inside. The Seattle jobbers sent down a lot of exhibits, and also each sent a man for a few days, and this, together with the material which the other electric contractors and the Puget Sound Traction, Light & Power Company were able to collect, made a very good showing. The booths were gaily decorated, the electric Victrola made music continually, and the electrically driven job press attracted a great deal of attention. The washing machines and vacuum sweepers in operation were interesting, the meter booth was always surrounded and the hot coffee and toast were popular. Plenty of attendants were on hand to explain the workings of all apparatus on display. "Do It Electrically" was preached to them from the time they entered the door until they left.

The show was open evenings only from 7 to 10:30, admission being free and no sales solicited. Free return car tickets were given to those who came on the cars to attend, a special conductor's check being evidence of carfare paid coming and a return pass issued at the show.

A free drawing was held each evening and a good electric device given away, iron, toaster, percolator, lamp, etc. The attendance averaged over 1500 each evening.

Rome C. Saunders, assistant sales manager of the Puget Sound Traction, Light & Power Company, who managed the affair, states that "the interest has been very good, and we feel that although it costs a good deal to put on such a show, it is going to have lasting results."

Butte's Boosting.

The Montana Power Company filled the city with twenty-four-sheet posters proclaiming America's Electrical Week and an Electrical Christmas, ran considerable display advertising in the daily papers, and obtained considerable additional publicity. As their offices and salesrooms have a large and attractive frontage on Broadway, the principal business thoroughfare, they put in an elaborate window display.

In the window on one side was a log-cabin scene, illuminated by candles, with the old stone fireplace and chimney, the walls and roof and the coffee-pot and cooking utensils all smoked up—and, on the whole, quite a realistic scene representing the typical Butte home thirty years ago. In the window on the opposite side of the building, was the kitchen and dining-room scene in an up-to-date home of today, the cooking being done on an electric range, as well as the electric percolator and toaster and other electrical devices being shown in use. Everything in this scene was, of course, done in the latest and most up-to-date way—electrically. The illumination was taken care of here with the latest type of Edison Mazda lamps arranged so as to get the best possible results. A placard up in front stated that from a comparison of the two windows one will get a conception of what electrical progress has done for the home.

One of the big factors in the campaign was the hearty co-operation of the Montana Federation of Women's Clubs throughout the state. At the meetings of the different clubs of their organization they discussed the merits of the application of electricity to home life and the use of electrical devices and appliances both from a labor-saving and economical standpoint. The interest thus aroused in the thousands of housewives and mothers throughout the state of Montana will be of inestimable value toward the furtherance of electrical progress as it applies to home life. This co-operation of the Montana Federation of Women's Clubs in the celebration of America's Electrical Week will bring great good, indicating as it does that the women of our country are beginning to realize the many advantages of using things electrical.

J. A. Colliton, of the company's sales and service department, was in active charge of the campaign. He advises that, "on the whole, we believe that we have aroused a great deal of interest throughout the state of Montana in the observance of America's Electrical Week, and that some good will surely be accomplished."

San Diego's Campaign.

The San Diego Consolidated Gas & Electric Company co-operated with ten electrical contractors of San Diego in holding what is reported to be one of the most comprehensive and attractive shows held in the West. The show was open from 2 p. m. till 10 p. m. each day from December 2 to 9, and was given a great deal of publicity through the newspapers. The show occupied a space 50x150 ft. in the entire second floor of the Arcade building. Music was furnished by a five-piece orchestra, and dancing enjoyed by those who so desired. The attendance was large and the sales very good.

North Yakima's Participation.

At North Yakima, Wash., the publicity for America's Electrical Week consisted of billboard displays, special window displays by the Pacific Power & Light Company and the four electrical dealers, the trims being changed several times during the week. Special displays in the salesrooms of these places of business was made.

The power company ran a special, selling toasters for $2.50 each, and also offering a 40-watt Mazda lamp with each appliance sold during the week.

Reno's Publicity.

Two weeks previous to December 2d some full page advertisements were run in the daily papers featuring the objects of the Society of Electrical Development, and using much of that society's material relating to the importance of the electrical industry.

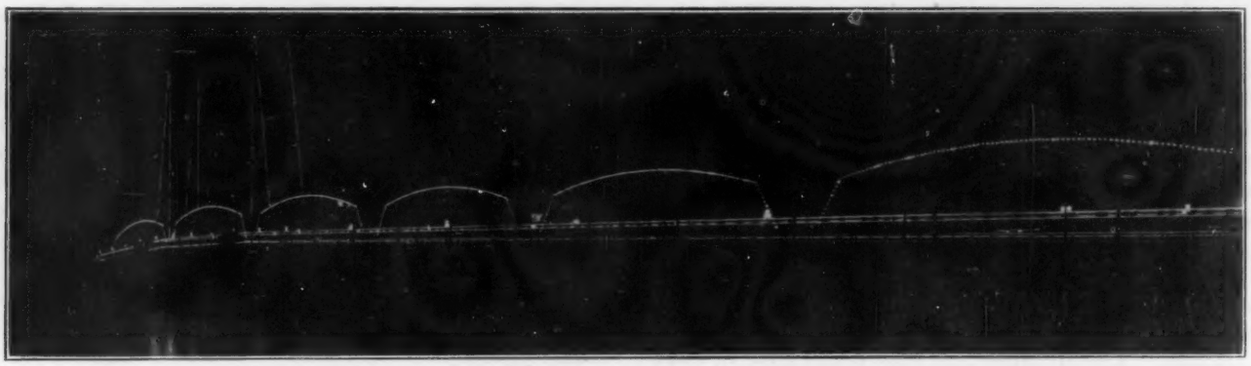
An unfortunate accident destroyed one show window, but the remaining one attracted much attention. It consisted of a gigantic reproduction of the Aladdin poster, made of vari-colored fabrics. The genii figure formed the background with life size Aladdin in the foreground. Aladdin was articulated. In operation his arm moved to the switch, which was actuated by an invisible mechanism, and in doing so turned on concealed lights which brought into view the figure of the Genii. The illusion was very successful. A nine-point flasher which controlled the various movements was wired up in plain view to show how the various effects were obtained.

An Articulated Aladdin at Reno.

The Reno Power, Water & Light Company's office was elaborately decorated in the colors of the official poster with a number of tables on which were percolators and toasters connected and ready for operation. Young ladies were present to assist the guests in the preparation of toast and coffee, if necessary, but visiting ladies were urged to try the appliances themselves, which most of them did to their great delight. After the second day the affair easily became a sort of continuous party.

During the week all electrical devices, except ranges were sold at a twenty per cent discount—this discount however being payable in Mazda lamps. One year ago a straight discount was used but it was found that a discount in lamps, or other merchandise, is more effective than a cash discount.

No effort was made to force sales. Instructions were to make everybody have a good time, and glad to come again; but the sales show a better week



Illumination of Portland's Bridges.

than last year, although that was considered very successful. This is somewhat of a surprise because it was feared that the advanced prices in electrical appliances would reduce the number of sales. Such does not seem to have been the case however.

Portland's Participation.

At Portland the chief attraction was a mammoth electrically lighted Christmas tree in the middle of a prominent downtown street. The numerous colored lights on this tree were operated by a flasher, which gave a very pleasing effect. The tree was surmounted by a large star outlined in white Mazda lamps, this star being 6 ft. in diameter. The tinsel, medallions,

Electric Christmas Tree at Portland.

etc., with which the tree was decorated, were effectively brought out by flood lighting from a near-by building. A band concert was held here on the last night of the week.

At a number of prominent downtown street intersections papier-mache genii similar to the one shown on the Electrical Week poster were erected. These genii were illuminated from the pedestal on which they stand through a green glass. This pedestal also had transparent glass signs on each side with such slogans as "Do It Electrically" and "Give Electrical Christmas Gifts," etc.

Along the principal downtown business streets the boulevard posts were decorated with greens and festoons strung between the posts, adding materially to the holiday atmosphere of the shopping district.

The five bridges crossing the Willamette River in Portland were illuminated each night by outline lighting.

The Northwestern Electric Company operated an attractive illuminated steam curtain on the roof of a prominent downtown building, which called forth considerable favorable comment from pedestrians.

At thirty different locations in the various parts of the city twenty-four sheet posters were put up, one-third of which was taken up with the Electrical Week poster furnished by the society, the remaining two-thirds being devoted to general advertising of electrical Christmas gifts and electrical appliances.

Electrical talks were given by men prominent in the local electrical industry at the luncheons of the various civic organizations, such as the Rotary Club, Ad Club, Chamber of Commerce, Progressive Business Men's Club, etc.

A contest was put on for the best electrical window display, with two sets of prizes, one for electrical dealers and the other for non-electrical concerns. In the first class the first prize was won by the Morrison Electric Company, the second prize by E. L. Knight & Co. In the second class the first prize was won by Meier & Frank Company, and the second prize by Olds, Wortman & King, two of the largest department stores in the city. A large number of other very attractive window displays were made by both electrical and non-electrical dealers, prominent among which were the displays of Woodard-Clarke Drug Company and Smith-McCoy Electric Company.

Electrical Week cards were on display in six hundred of the Portland street cars for the two weeks preceding the week. The electrical interests co-operated in running an electrical page for a number of times in the three leading papers.

A number of large electrical week banners made up of the 7 by 9 ft. posters mounted on a wall mat backing, were found to be very effective use for these in a number of prominent windows, and in such locations as the rooms of the Chamber of Commerce.

The plants of the local telephone companies and the light and power companies were thrown open to visitors.

A number of the Electrical Week wagon banners have been put in circulation on the wagons of some of the department stores, and of course, on those of all of the electrical firms in the city.

A large number of the poster stamps were put out by the department stores on their delivered pack-

ages, probably 50,000 stamps being put in circulation in this manner alone.

Approximately 40,000 of the Electrical Week folders were distributed to electrical consumers with the bills of the Portland Railway, Light & Power Company, and also those of the Northwestern Electric Company. In this way a personal announcement has been made to practically every electrical consumer in Portland.

The Electrical Week slide was shown in practically all of the moving picture and vaudeville houses in Portland.

Los Angeles Contractors.

Due to the uncertainty regarding the future ownership of the distribution systems in Los Angeles, the several central stations did not participate actively in the week's celebration. The contractors and dealers, however, made excellent displays in their windows and stores, showed on many billboards throughout the city and did some excellent advertising in the newspapers. Several civic organizations were addressed on electrical subjects and a big Jovian rejuvenation was held on Friday night, December 8th. The Southern California Edison Company also carried on a heavy advertising campaign on electrical appliances throughout 60 towns in Southern California.

Stockton's Participation.

At Stockton, California, the Western States Gas & Electric Company joined with the electrical contractors and dealers in an effective series of window and store displays. The Western States Gas & Electric Company erected two attractive booths decorated with purple and gold in their salesrooms and here assembled a complete exhibit of lighting, heating, cleaning and cooking devices. Those contributing to the display were: Electric and Machine Equipment Company, Electric Engineering & Supply Company, Edward L. Gnekow, Goold & Johns, Gould the Light Man, Home Electric Company, Patzer's Electrical Works, Noble D. Powell, Tiffany's, Harry S. White, Electrical Contractor, Commercial Electric Company, Lyman Electric Company, The Ruhl-Goodell Company, Willard Hardware Company, A. Alberti and Branch's (Inc.)

A big campaign of newspaper and billboard publicity was instrumental in attracting large crowds. Electrical musical concerts were held each evening. The Elks' building was flood-lighted and a large electric siren afforded audible evidence of the show's location. H. S. Batchelder commercial agent of the Western States Gas & Electric Company, had charge of the week's activities.

Sacramento's Success.

Sacramento's beautiful show in the banquet room of the Hotel Sacramento was opened Monday evening, December 4th, by an electrical dinner where ninety-two of Sacramento's electrical men assembled. The chief speaker of the evening was Albert H. Elliott, secretary of the Pacific Coast Electrical Supply Jobbers' Association, who gave a masterly address on "Electricity, the Friend of Man." J. C. Hobrecht also told of the use of electricity in every day life. The show itself was noteworthy for the daintiness and effectiveness of the display. It included heating and cooking devices, automobile accessories, kitchen and laundry equipment and musical, telephone and telegraph instruments. The committee of arrangements consisted of Chas. W. McKillip, Carl Beaton, J. C. Hobrecht, Thomas Scott, C. V. Schneider and W. B. Camp, the latter managing the campaign.

The Week in Utah.

Entering into the spirit of America's Electrical Week enthusiastically, the electrical industry of Utah participated in the observance of the event this week to a much greater extent than last year and with the certainty of beneficial and very material results accruing. Over 150,000 pieces of literature on America's Electrical Week, including leaflets, posters, poster stamps, street car banners and window lithographs, were distributed to the people of the state. In addition, approximately 100 different newspaper advertisements, each averaging 20 inches, were used in the city and country newspapers of the state to advertise America's Electrical Week.

A great deal of publicity has been contributed by the newspapers and a total of some 25 mercantile firms, outside of the electrical industry, dressed their show windows electrically this week in observance of the event. The larger towns in the state celebrated with electrical bazaars, special merchandise sales and specially decorated store interiors, so far as electrical companies are concerned.

In Salt Lake, in addition to the large amount of advertising in the newspapers and literature distributed, a large number of display windows, both in and out of the electric industry, carried electrical displays; the Utah Electric Club had as its guests at the Commercial Club on Wednesday evening the members of the Transportation Club and members of the various engineering societies of the city and state, to witness, the first presentation here of the motion picture history of transportation in the United States, entitled "The King of the Rails." The same film was shown to the members of the Rotary Club at a special dinner Tuesday evening, December 5, as a feature of the event.

At Ogden, Utah, a large electrical show was held, participated in not only by the electrical interests of that town, but by those manufacturers who use electrical service.

America's Electrical Week has been more generally and fully observed by the electrical industry and participated in to a greater extent by the general public than any similar event in the history of the state.

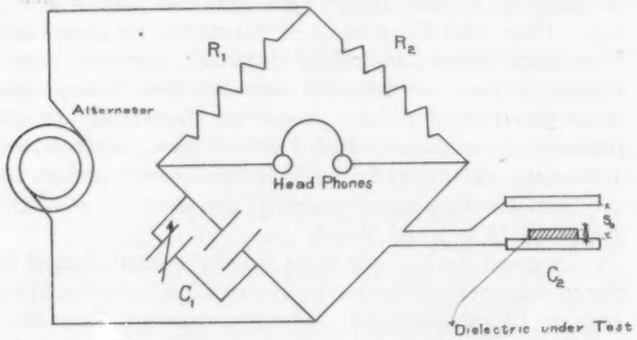
CONCESSIONS FOR OIL DOCKS AT PERUVIAN PORTS.

The Government of Peru has granted concessions to the West Coast Oil Fuel Company for the construction of iron docks at Callao and Paita These docks will be used exclusively for the loading and unloading of oil consumed by incoming and outgoing steamers. Pipe lines will carry the oil from the tanks of the company to the docks. The traffic of the oil docks will be subject to the usual port and customs regulations. The concessions, as published in La Revista Comercial, are for a period of 25 years from the date of the opening of the docks to service.

A NEW METHOD FOR THE MEASUREMENT OF THE DIELECTRIC CONSTANT.

BY J. PARKER VAN ZANDT.

The importance of a knowledge of the values of the dielectric constants for various dielectrics has led to the development of certain methods of measurement[1] whereby the desired constants may be obtained. These methods have proved adequate for precise measurements within the degree of accuracy required in determinations of this character and it is not the purpose of this article to offer any new arrangement permitting greater precision.



A Short and Ready Method for Making Connections in Determining the Dielectric Constant.

If, however, it is desired to make a rapid and approximate determination of the dielectric constant of a given material, certain serious difficulties will be found in the use of the more precise methods. In the older arrangements the capacity of a given condenser is measured when the plates are separated by air by the use of some form of an electrometer, usually the Kelvin Absolute Electrometer[2]. The change in electric stress and consequent change in the electrometer readings upon the introduction of the dielectric whose specific inductive capacity is desired is related in a pre-determined way with the dielectric constant of the specimen under test. For anyone who has worked with an absolute electrometer it is needless to comment upon the difficulty of making rapid and easy determinations with such an instrument. A case has recently come to the writer's attention of an incident which occurred in one of the universities of the Middle West. In connection with a research problem it was desired to know the dielectric constant of a certain piece of glass. A Kelvin Absolute Electrometer was used and after some difficulty a set of readings was obtained for the capacity of the given condenser when the plates were separated by air. The piece of glass which was then introduced was found to have acquired an electric charge; the disturbing effects of this charge were not greatly lessened by passing the glass through a flame. Readings, however, were finally obtained and upon substitution in the formula a negative dielectric constant resulted. The following day a fresh attempt was made, but when the readings were substituted in the proper expression the denominator became zero, indicating an infinite dielectric constant. The attempt was then abandoned awaiting a better method of measurement. The arrangement to be described below was first suggested to the writer by Professor F. E. Pernot of the University of California and is thought to meet the requirements of a method permitting a rapid and easy determination of the dielectric constant.

Let us review briefly the theory of charges in non-homogeneous dielectrics. Experiment shows that the electrostatic flux density produced in any dielectric when placed in an electrostatic field is directly proportional to the resultant field intensity and, except in the special case of certain kinds of crystals, the direction of the electrostatic flux density coincides with the direction of the field intensity. The ratio of the electrostatic flux density to the field intensity is called the dielectric constant of the dielectric. That is, calling $4\pi D$[3], the electrostatic flux density at any point in the dielectric, and H the resultant electrostatic intensity at this point, the dielectric constant of the dielectric at this point is

$$K = 4\pi D/H \quad \ldots\ldots (1)$$

The dielectric constant is thus shown to be exactly analogous to magnetic permeability.

Now the surface integral of the displacement, D, is equal to the quantity of electricity or the charge, Q_e, in c.g.s. units.

$$D = \delta Q_e/\delta A \quad \ldots\ldots (2)$$

And the integral of the gradient or the field intensity, H, is equal to the potential difference. That is,

$$E = \int_0^s \delta H = sH \quad \ldots\ldots (3)$$

Consider, then, any number of flat plates separated by sheets of dielectric of varying thickness.

Let: s_1 be the thickness in cms. of the first sheet.
s_2 be the thickness in cms. of the second sheet.
.....
s_n be the thickness in cms. of the n-th sheet.

Let: k_1 be the dielectric constant of the first sheet.
k_2 be the dielectric constant of the second sheet.
.....
k_n be the dielectric constant of the n-th sheet.

Let: Q be the charge per unit area. Then by equation (2): $Q = D$.

By equation (1) we may write:

$$\left.\begin{aligned} H_1 &= 4\pi D/k_1 = 4\pi Q/k_1 \\ H_2 &= 4\pi Q/k_2 \\ &\ldots\ldots \\ H_n &= 4\pi Q/k_n \end{aligned}\right\} \quad \ldots\ldots (4)$$

Combining equations (3) and (4) we may express the potential drop across each sheet:

$$\left.\begin{aligned} e_1 &= s_1 H_1 = s_1 4\pi Q/k_1 \\ e_2 &= s_2 H_2 = s_2 4\pi Q/k_2 \\ &\ldots\ldots \\ e_n &= s_n H_n = s_n 4\pi Q/k_n \end{aligned}\right\} \quad \ldots\ldots (5)$$

[1] J. Henderson: Practical Electricity and Magnetism, Third edition, 1908. See paragraphs 254-265 and list of references to scientific papers.

[2] J. J. Thomson: Elements of the Mathematical Theory of Electricity and Magnetism pp. 97-98 et seq.

[3] For an explanation of the presence of the factor 4π, see Maxwell: Electricity and Magnetism, Vol. 1. "D" is the term which Maxwell has named the "Displacement."

If E is the total voltage drop across m sheets we may indicate equations (5) by the summation:

$$E = 4\pi Q \sum_1^m s_n/k_n \quad \ldots\ldots (6)$$

The resultant capacity of the combination of plates and dielectrics, C, expressed in electrostatic units per unit area is:

$$C = Q/E = \frac{1}{4\pi\ (s_1/k_1 + s_2/k_2 + \ldots + s_n/k_n)} \quad \ldots\ldots (7)$$

But by equation (5_n),

$$Q = e_n k_n/4\pi s_n \quad \ldots\ldots (8)$$

Substituting this value of Q in equation (7) and applying equation (3), we may write at once the general expression for the electric gradient in any sheet:

$$H_n = e_n/s_n = \frac{E}{k_n\ (s_1/k_1 + s_2/k_2 + \ldots + s_n/k_n)} \quad \ldots\ldots (9)$$

Referring now to the diagram, we have an impedance bridge of the usual type arranged for the comparison of two capacities. If the bridge is excited by means of a sine wave alternator of, say 500 cycles and 200 volts and the ratio of the resistance arms R_1 and R_2 or the capacity C_1 is varied for a position of minimum sound in the telephone receiver, the condition obtains:

$$R_1 C_1 = R_2 C_2 \quad \ldots\ldots (10)$$

Let: s_0 be the initial spacing of the plates of C_2.
k_0 be the dielectric constant or air, = 1.0000.
k be the dielectric constant to be determined.
s be the thickness in cms. of the dielectric sheet.
A be the area in sq. cms. of the dialectric sheet.
C_a be the capacity of C_2 in air for an area A.
C_a' be the capacity of C_2 with composite dielectric for an area A.

Then by equation (7):

$$C_a' = \frac{A}{4\pi\left[\frac{s}{k} + \frac{(s_0 - s)}{k_0}\right]} \quad \ldots\ldots (11)$$

Let the change in C_2 occasioned by the introduction of the dielectric under examination be ΔC_2, expressed in electrostatic units. Then:

$$\Delta C_2 = C_a' - C_a = \frac{A}{4\pi}\left\{\frac{1}{\frac{s}{k} + \frac{(s_0 - s)}{k_0}} - \frac{1}{s_0}\right\} \quad \ldots\ldots (12)$$

Solving for the dielectric constant,

$$k = \frac{4\pi s}{\frac{A}{\Delta C_2 + \frac{A}{4\pi s_0}} - 4\pi(s_0 - s)} \quad \ldots\ldots (13)$$

Now ΔC_2 is known in terms of the resistance ratio R_1/R_2 and the change in C_1, ΔC_1, by the relation

$$\Delta C_2 = \frac{R_1}{R_2}\Delta C_1 \quad \ldots\ldots (14)$$

Hence to determine k it is only necessary to:

1. Measure the thickness and area of the dielectric under test,
2. Measure the distance between the plates of C_2,
3. Know the ratio of R_1 to R_2, in any units,
4. Have a calibrated variable capacity, C_1.

The variable condenser may be calibrated in any one of the standard ways, such as by comparison with a standard condenser, by the use of a ballistic galvanometer, etc.[4] If a variable air condenser with a graduated scale is used it is convenient to plot a calibration curve of degrees deflection against microfarads.

In the construction of C_2 no special precautions need be taken beyond those which readily suggest themselves. If s_0 is an adjustable distance a considerable range of values of dielectric constant may be determined with a single small calibrated variable condenser. All errors due to edge effects are avoided by constructing the plates of C_2 considerably larger than the sheet of dielectric under measurement. For other methods of exciting the impedance bridge and for indicating the balanced condition, such as the use of storage cells and a commutator, vibration galvanometer, etc., reference should be made to any standard text on electrical measurements.

If there is available an alternator of 200 cycles or more, with approximate sine wave characteristics, the use of a telephone for indicating the balanced relation in the impedance bridge will be found very satisfactory.

An illustrative example may be given to show the ease of computation. Let it be required to find the dielectric constant of a plate of composite glass the thickness, s, of which is .16 cms. and the area, A, is 300 sq. cms. Let R_1 be 300 ohms and R_2 be 1800 ohms. and the distance s_0 between the plates of C_2 is set at .40 cms. It is found that a deflection of 40 deg. in the the bridge after the introduction of the dialectric in C_2. From the curve of calibration.

$\Delta C_1 = 40° = 0.00020$ microfarads.

By equation (14)

$\Delta C_2 = 0.00020 \times 9 \times 10^5 \times 300/1800.$

$= 30.$ electrostatic units.

Substituting in equation (13)

$$k = \frac{4\pi \times .16}{\frac{300}{30 + \frac{300}{4\pi \times .40}} - 4\pi \times .24} = 6.06.$$

Assuming that the distances s and s_0 can be measured to within one-tenth of a millimeter, the accuracy of the determination depends upon the degree of precision in the calibration of the condenser. It will be noted that ΔC_2 enters in equation (13) as an additive term to $A/4\pi s_0$. Hence if the area is chosen reasonably large and the value of k is near unity,—such as the constant of india rubber, for example—a five per cent error in the value of ΔC_2 may introduce less than one per cent error in the final determination of the dielectric constant.

[4] See J. Henderson: Practical Electricity and Magnetism, Chap. V. A variable condenser can be constructed whose capacity may be calculated from its dimensions.

THE NEWEST AND LARGEST GIANT GOLD DREDGE.

Electricity still continues to play the leading role in the design and evolution of the modern gold dredge.

Yuba No. 16 at Hammonton, Cal., is destined to be the largest gold dredge in the world. Its hull was launched on the 26th of November. The 900 tons of steel slid into its inland pond on schedule time just six weeks after the first steel was laid.

The dredge will be completed and operating in February. Like its immediate predecessor Yuba No. 15, described at some length in our issue of Nov. 11, 1916, it is all of steel and equipped with an endless chain of 100 two-piece manganese steel buckets, each holding 18 cubic feet of gravel and electrically operated throughout. It will dig 82 ft. below the level of the water in which it floats, and will have an installed motor capacity of over a thousand horsepower.

Yuba No. 16 is unique in that it will be used for making a channel or the flood waters of the Yuba River. Two stackers at each corner of the stern will stack the waste far to the side. Thus the dredge will recover the gold, form a channel and build the levees to confine it—all at one operation.

Costing close to half a million dollars Yuba No. 16 will pay for itself in a year and a half. For the other ten or fifteen years of its life it will earn a profit of a thousand dollars a day for its owners. It will excavate 10,000 cubic yards of gravel per day extract the infinitesimal amount of gold, and stack the waste —at a cost of little over three cents per cubic yard. This Yuba dredge is operated by a crew of only three men.

As an instance of the increasing cost of material, the advance in the actual market value of steel used in this dredge is interesting. Since the steel for its construction was ordered, the cost of this product has advanced to such an extent that the dredge has an increased intrinsic value of sixty thousand dollars from this source alone.

The increased uses of electrical energy for the operation of gold dredges is of especial interest to hydroelectric companies of the West. California design is practically setting the standard for the gold dredge the world over.

LINKING-UP ELECTRIC POWER STATIONS.

A discussion in a recent issue of The Electrical Review of London concerning the difficulties of interconnecting various power companies is of interest to our readers. Some briefs from this discussion appear in the following lines:

It is now pretty well agreed by everyone who has taken the trouble to investigate the matter, that material benefits are to be derived from linking-up electricity supply stations; but while there has been some progress in this direction, a great deal remains to be done before the full advantages of the scheme are realized. The difficulties involved in interconnecting the London electricity supplies are much more formidable than daily newspaper writers seem to imagine, for their idea, apparently, is that it is simply a question of joining together a few cables or wires, when a thoroughly reliable supply of electricity for London will be assured. Unfortunately, however, the problem is much more difficult. Had it been realized in the early days of the electrical industry that the coupling-up of electrical systems would, in time to come, lead to marked economy, as well as greater reliability and a reduction in the total amount of plant, it is more than likely that greater uniformity in voltages and frequencies would have been aimed at. As it is, stations have been erected with frequencies ranging from 25 to 100 cycles per second, and there is also considerable diversity in voltage. Even the frequencies of some of the larger and more recent stations which might advantageously be interconnected are not by any means in conformity.

In America, where coupling-up has been practiced on a much greater scale than it has been here, very similar conditions prevail. The frequencies of the American stations are 25, 33, 40, 50 and 60 cycles. In the past there were 125 and 133-cycle stations, but these have now practically disappeared. The two frequencies most commonly used at the present time are 25 and 60 cycles, and there appears to be no very logical reason why any other values should be adopted in future. It is claimed that modern rotary converters will work quite well on 60-cycle circuits, so that there is no need to adopt 40 or 50 cycles on this score.

The Largest Electrically Operated Gold Dredge—The New

So far as America is concerned, there appears to be a distinct tendency to adhere in future to 60 and 25 cycles, and to eliminate other frequencies as occasions arise. To link-up American systems many frequency-changers have been built, and when similar work is seriously commenced in this country there will undoubtedly be a big demand for these machines. Having equipped our stations with complete disregard to the possibility of linking-up, we are in the unhappy position of having stations working at 25, 33, 40, 50, 60, 83, 85, 90 and 100 cycles per second. Moreover, there are many different voltages, and some stations supply single-phase current, a few two-phase current, and the bulk of the large and most modern stations three-phase current. There are also, of course, some three-wire continuous-current stations which may eventually be converted into substations and fed from larger plants, or be interconnected with them, as in the case of other stations.

When larger power systems are interconnected, the possibility of very heavy currents flowing in the mains at times of short circuits must be kept in view. The use of current-limiting reactances demands, under these conditions, very careful consideration, especially when the stations contain large turbo-alternators. When the stations are at a considerable distance apart, the transmission lines or cables interconnecting them provide a certain amount of protection; in fact, in the case of some of the large interconnected waterpower schemes, nothing beyond the transmission lines has been necessary to keep the short-circuit currents within permissible limits, for the lines act in a similar way to reactances connected between sections of station bus-bars. But it is to be remembered that many of these waterpower stations contain large low-speed generators with comparatively low short-circuit currents. Mucht depends on the sizes and characteristics of the plants and the distances between stations. On some of the interconnected systems in America, current-limiting reactances are used pretty extensively and there is little doubt that as the capacities of stations in this country increase, and as one by one they are interconnected, this practice of using reactance coils in generator leads, between sections of station bus-bars, and in feeder circuits, will become more general than it has been hitherto.

NOTES ON MUNICIPAL ENGINEERING PROBLEMS.

R. H. Thompson, a noted consulting engineer of Seattle, Wash., made an address recently before the Reed College extension department and the Portland Realty Board on "Engineering Problems of City Development."

Mr. Thompson was city engineer of Seattle and managed the expenditure of more than $40,000,000 for civic improvements. He said in part:

In 1765 a tinker in Glascow got the idea that the expansion of steam would move a piston. Then after 23 years of personal saving and labor he brought forth the first steam engine in 1788. At this date the dawning of a new age came. This was followed by Fulton with the steamboat and Stephenson with the locomotive. With this new age came concentration of population into cities and the city fathers had new obligations placed upon them.

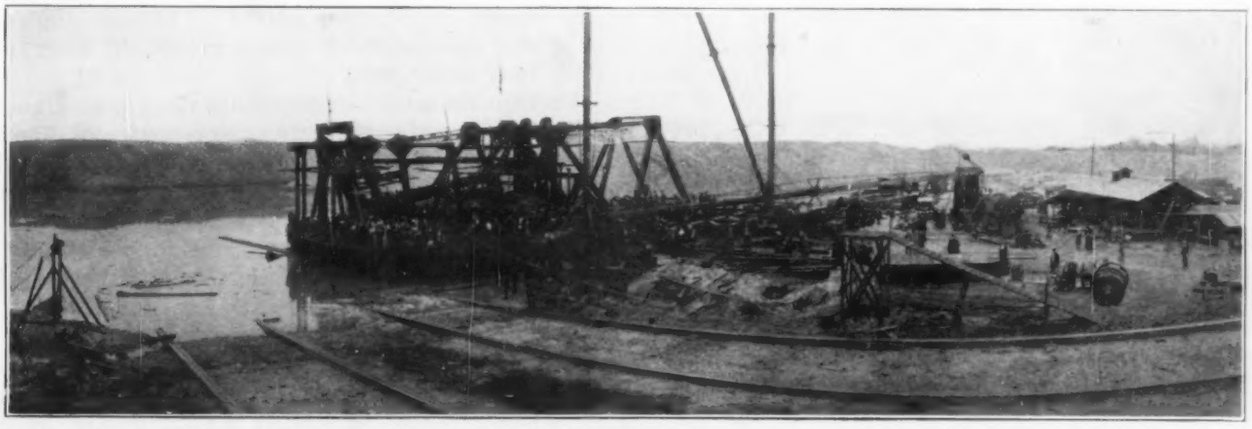
After 2000 years London had a population of 700,000, one hundred years afterwards it had increased to 5,000,000 due to the effects of steam.

Every public improvement has been fought. Nothing has ever been done by cities in sanitary lines until the death rate became alarmingly high. Even Berlin had no sewers until 1888. The death rate in Russia today without sanitation is 6 out of every 10 infants.

Public improvements are always fought, because it will increase taxes. But gradually the public began to realize the meaning of "no man liveth alone and no man dieth alone," and municipalities began to bring water into the cities, put in sewers, pave and clean streets and establish places of recreation as man became unable to do the necessary labor for existence, since disease began to carry them off.

Ben Franklin seems to have the honor of causing the first street light to be installed. He had a friend who had a bad mud hole in front of his house and he induced him to hang a lantern over it.

It is absolutely necessary for the development of productive industry to have the proper avenues of communication to carry them out. A city depends upon its "Hinter Land" and ease with which communication is made between it and the city. Time is the controlling element and bad roads and steep grades cause a great waste of time.



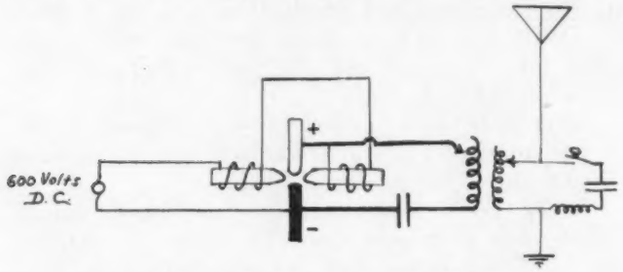
Yuba No. 16 Under Construction in the Gold Dredging Fields of California.

THE SINUSOIDAL WAVE METHOD OF RADIO TELEGRAPHY.

BY WALTER HAYNES.

A second general class of transmitters employ undampt or sinusoidal ether waves for transmitting signals. It is customary in this type of transmission to permanently connect (either conductively or inductively) the high frequency alternating current generator to the antenna and to form code by diverting the antenna current to an absorbing circuit for such period as it is desired to discontinue radiation.

The most interesting feature of undampt equipment is the high frequency generator. The first was the oscillating arc which was discovered by Tesla and Duddell and later improved by V. Poulsen. The wiring diagram for this generator is given in illustration. The + and — electrodes of the arc are water cooled copper and carbon respectively. The supply current is passed through an electromagnet winding which is so constructed and situated that an intense magnet field is maintained in the vicinity of the arc. A further refinement consists of an atmosphere of hydrogen surrounding the arc. Both the magnetic field and the hydrogen envelope accelerate the oscillations and enable the arc generator to operate at radio frequencies.



The Wiring Diagram for the High Frequency Generator.

Many attempts have been made to produce high frequency alternators embodying the principles of ordinary electro-magnetic induction. To reach radio frequencies requires either, an excessively large number of poles, enormous speeds, or a compromise between these extremes. Alexanderson's 100,000 cycle, 2, 1 kw., 20,000 r.p.m. alternator is the most successful of this type of machine to appear, and it is far from practical for commercial work.

R. Goldschmidt has developed an alternator possessing a very unique basic principle. Starting with a direct current stator, L, as shown in the Goldschmidt diagram, is excited while a rotor revolving N revolutions per second has induced within it a current of N cycles per second. A tuned circuit, L_1, C_1, C_2, L_2, presents virtually no impedance for this frequency, hence the corresponding current is large and by reaction on the stator sets up a current of frequency 2N therein. Now the circuit L, C, L_3, C_3, is tuned for maximum admittance for this frequency whence the current is limited only by the resistance of the circuit. The fluxes resulting from this current together with the speed of the rotor sets up a current of frequency 3N in the circuit L_4, C_4, C_4, which is also tuned for maximum current at the frequency 3N. Similarly this current induces a current of frequency 4N, in the circuit L, C, A, G. Since all circuits of this generator are "tuned circuits" it is highly important that the rotor speed be maintained constant at a set value.

Generators of this type are in daily use on trans-Atlantic service and are reported highly satisfactory.

The use of vacuum bulbs for producing high frequency oscillations is now most promising. Several types are now in process of development while some may be considered fairly perfected. As is well known, long distance radio-telephony was so perfected a year ago, that by its use, the human voice was transmitted from Arlington, Va., to San Francisco, Cal., with all desired degrees of success, and understandable even in Honolulu. The exact type of bulb used has, to date, not been made public.

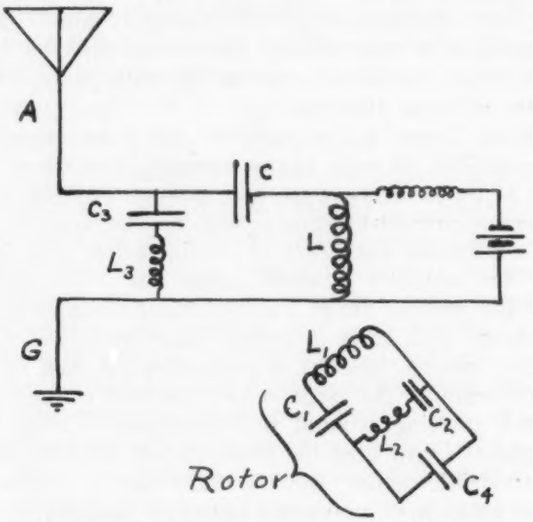


Diagram of Connections for the Goldschmidt Alternator.

A most remarkable bulb which may be used for receiving and amplifying as well as producing undampt oscillations, has been developed by Prof. Geo. W. Pierce.

This bulb utilizes a pencil of cathode rays which is suppressed by a reverse e.m.f. to a critical value but which will operate on the addition of a very small triggering e.m.f. This bulb was recently used in Cambridge, Mass., for detecting and recording messages originating in Germany, upon a tape. So well did it operate that in three hours' receiving not a word was lost, except for a few minutes while a high power station was working nearby. The modus operandi of this tube and to a certain extent, all tubes, is not yet fully understood.

Perhaps the latest developments along radio transmitting lines are given to perfecting a source of direct currents of high potential. Three general types will be mentioned in as much as they point out items of possible future interest.

Mercury arc rectifier tubes.

Rectification by means of electromic discharge of heated metals in vacuuo.

Rectification by means of a commutator.

The first two methods rectify single-phase currents, while the third operates on a nine-phase current. Direct current of 100,000 volts potential have been producted by these means.

SPARKS—CURRENT FACTS, FIGURES AND FANCY

Cleanliness is a new factor injected into illumination fixtures. The up-turned bowl used in modern indirect lighting systems is highly efficient only when scrupulously kept clean.

* * *

Central station managers in many sections of the West still continue to exert every influence in the promotion of appliance sales and the net result is proving highly satisfactory.

* * *

A carload of Maine lobsters have been shipped West and are today starting life anew in the waters of Puget Sound. It seems as if any form of life can get rejuvenated west of the Rockies—even the lobster.

* * *

Russian grammars have arrived on the campus of the University of Washington from London. This is another indication of Western awakening to engineering and commercial opportunities in countries bordering the Pacific.

* * *

Pyrometer tubes or tubes for ascertaining high temperatures are being designed and supervised in manufacture by the United States Bureau of Standards. They are said to be equal in quality to the refractory porcelain formerly obtained at Berlin.

* * *

Even the banking houses are to be awakened to the possibility of electrical display lighting of their windows. Eminent authorities argue that proper display of banking methods in window spaces would promote the banking habit.

* *

As to whether special peak operating and installation expenses pay for the outlay is being seriously called into question. The publicity is of high value in many instances, such for instance as ball games and the like, but the ultimate return small.

* * *

"How-I-Did-It" is a little series of short snappy prize stories that is being published by the Westinghouse Lamp Company. The stories are purely educative in value and are meeting with the hearty commendation of electric sales forces from all quarters.

* * *

The electrical motograph is becoming a powerful sales medium for department store advertising. In Chicago a brilliant line of moving words descriptive of the goods for sale within is tantalizingly made to play over the entrance of one of her huge department stores.

* * *

The frightful accident in Boston heralded in Western papers on election day, in which a large number of street car passengers were drowned, has caused the mayor of that city to call a noted conference to discuss the subject of safeguarding drawbridges in the future.

In the case of resuscitating a person suffering from an electric shock authorities agree that the work should be carried on without the slightest intermission for anywhere from an hour and a half to two hours, or until there is unmistakable signs of the final passing of the victim.

* * *

The safety first movement with its beneficial results is forcefully set forth in Illinois statistics where the number of accidental deaths by railways and electric lines has been during the past year reduced by two hundred eighty-six and the number of persons injured by fourteen hundred eighty-nine.

* * *

The city of Dayton has made a civil engineer its city manager. An eastern technical editor propounds the question, "Why should not county engineers become county managers?" The query is a pertinent one and well within the bounds of the expanding possibilities of the immediate future of the engineer.

* * *

A Chinese who has invented a typewriter for his native language has obtained a patent from his government to run for five years. This typewriter uses four thousand Chinese characters. The usual Chinese printing press uses six thousand characters. This new invention should vastly forward commerce and engineering in the Orient.

* * *

From a compilation of figures by "The Automobile," it is learned that California ranks fifth in the use of motor cars and trucks. The state is second per capita in the use of automobiles, having one machine for each fifteen people. The record is only exceeded by Iowa, with one machine to each thirteen people, while New York has only one machine to every thirty-nine inhabitants.

* * *

The last act of a show that has made a world's record by two years' run is now being prepared at the Panama-California International Exposition at San Diego. Because the last day of 1916 falls on Sunday, Exposition officials have chosen New Year's Day for ringing down the curtain. The last weeks of the Exposition are filled with events of great interest and the aim of the directors to make the final month the best of the two years appears to be realized.

* * *

"If the war is to keep up considerably longer, the United States will own the world," was a remark made a day or two ago by the most conservative banking authorities. "We are taking the accumulated wealth of the Entente Powers and paying for it with American labor and American products at monumental prices. We are sending wheat at $1.50 per bushel, with the prospects of $2 in the near future; other grain prices, while not as proportionately high, are nevertheless very profitable."

JOURNAL OF ELECTRICITY
POWER AND GAS

FOUNDED 1887

PUBLISHED WEEKLY BY THE

Technical Publishing Company

Crossley Building, San Francisco

ON LIBRARY CARS OF ALL SOUTHERN PACIFIC TRAINS

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico	per year,	$2.50
Dominion of Canada	" "	3.50
Other Foreign Countries within the Postal Union	" "	5.00
Single Copies, Current Month	each,	.25

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Municipal Ownership at Los Angeles

The intricacy of the fabled Gordian knot was simplicity itself as compared with the tangled web of finance and politics involved in the Los Angeles aqueduct power situation. The boldness and directness of the means employed to end the difficulty put the great Alexander to shame by their summariness. The municipality would not sell its power to the power companies in the field, the power companies and the city did not relish the idea of a long siege, and so the two power companies merged their systems in order that the city could purchase them.

This is the solution which waits but the approval of the California Railroad Commission, as regards the merger of the Southern California Edison Company and the Pacific Light & Power Corporation, and of the people of Los Angeles, as regards the assumption of a further bonded indebtedness of twelve million dollars. Precedent would indicate the acquiescence of the commission and of the people. The proposed merger will facilitate large savings in operation, make for greater efficiency, and insure continuity of service. The people have already voted ten million dollars in power bonds for properties which can be more economically operated by a further expenditure of twelve million to acquire the distribution systems serving two-thirds of the city.

To be sure, the Los Angeles Gas & Electirc Company is already serving the remaining third and will undoubtedly get its share of the other business when competing with the municipally owned system. But a fair share of the twelve million dollars might later be applied to the purchase of this system, with its steam plants, instead of the city's building more hydroelectric plants.

It is evident that a majority of the people of Los Angeles desire municipal ownership of their electric light and power service, even though the taxes are already close to three per cent. While wise economists point out the folly of such political operation, there is no gainsaying the fact that it is preferable to cut-throat competition and duplication of investment. Furthermore, the city need not go to the expense of constructing steam plants to insure continuity of service.

Any contract whereby the power companies will supply current to the city will undoubtedly give a smaller return on the inevstment than has been the case in the past. This reduction in income, however, will be compensated by greater immediate stability of investment with the possibility of greater extensions in supplying industrial needs. The next ten years, under such an arrangement, should witness new construction of both hydroelectric and steam plants to care for the increasing needs of this prospering territory.

The proposed solution represents mutual concession. At this stage of the negotiations no one can

safely predict the outcome. But certainly both the contracting parties are to be congratulated upon the evidence of a spirit of compromise in a case where a deadlock threatened dire consequences. The outcome will be watched with interest throughout the country, particularly by the people of Central California, who will face much the same problem when Hetch Hetchy power is developed.

A Little Story With a moral

The thrilling performance of radio telegraphy of recent occurrence, wherein a message of greeting from the President of the United States to the Mikado of Japan was made to circle half the globe, brings to a climax a story of remarkable achievement that has a moral to it for all workers in the field of electrical activity.

Here it is:

Michael Faraday was a poor boy in England. He felt he had it in him to become a great man. So he started out performing experiments with certain pieces of electrical apparatus. He was earnest and painstaking and though possessed of little mathematical knowledge he compiled research data that are today authorities along certain lines of investigation, in spite of the fact that a century has nearly passed since his time.

After Faraday's experimental research data became known to the world an eminent mathematical physicist, Maxwell by name, grouped together Faraday's work in such a manner that, although Faraday had never established experimentally the existence of radio ether waves, still Maxwell was able to establish the profound conclusion from mathematical deduction alone that radio ether waves did as a matter of fact exist.

After Maxwell's time came a brilliant young German investigator, Hertz by name, who carried Faraday's ground work and Maxwell's deduction to such further limits that he was able to send these waves experimentally across his laboratory.

Later came Marconi and put to practical application the laboratory experiments of Hertz. And finally within the past month other investigators have carried the work to further limits. Even the Mighty Pacific has been spanned by radio ether waves with a single relay at the Hawaiian Islands.

This story which reads like romance has a profound application in modern business endeavor. In this instance it is seen that the brilliant achievement of the month would never have been possible without the successive coordination and carrying forward of human intelligence by master minds.

The man today who thinks that he alone can unlock the great possibilities of business endeavor by means of his own self-centered ideas has a long road to travel. What could Maxwell have done without the groundwork of Faraday, or Marconi and later investigators without the convincing experiments of Hertz?

The moral to this story is self-evident. Success today is built upon the foundation laid by a thousand master minds working side by side. To safely advance forward in utilizing the truths brought to light hour by hour in present day industry, the practical application of one word is necessary—cooperation.

America's Electrical Week has set the pace, let all during the new year harvest the fruits incident to co-opertion by even still more fervent endeavor.

A State-Wide Opportunity for Research

In the issue of the Journal for November 11, 1916, editorial comment was made upon the founding of a Bureau of Municipal Research in San Francisco. At that time it was pointed out that such an enterprise was not only to be welcomed in municipal activity, but similar work should extend at once to cover activities of the entire state.

A problem of immediate and pressing importance that may well be referred to a bureau of research has been forcefully brought to light in reviewing the bitter controversy of Southern California between the power companies supplying the city of Los Angeles and the locally owned municipal supply. Recent advices indicate that an adjustment of this problem is not as near at hand as might be desired.

A second striking instance of such problems is that of the Hetch Hetchy and its possible unbalancing of the present power distribution in Central California.

Sooner or later one or the other of the parties to this issue are going to be woefully disappointed in the readjustment of power distribution after the advent of this supply in the markets of the state.

There is only one truth to be known about this problem and a bureau of research, properly constituted, is the practical means by which the public may ascertain the plain, bare facts and formulate a proposal for amicable adjustment of its various ramifications.

As to how this board may be constituted some may differ as to details, but when men really agree that it is the plain, ungarnished truth that is desired, stripped of political or private bias, this detail sinks into insignificance.

This state has at its command engineers and other citizens of world-wide note for fairness and integrity, who could properly dispose of these matters in short order, provided all agreed that only the plain facts were desired to be known.

Such a commission—say composed of five men, possibly an engineer, a lawyer, an agriculturist, a banker and a business man—serving without salary—could review the findings of the research board and then propose a solution that would unquestionably meet public acceptance on all sides.

The financial issues ahead in this state and other commonwealths of the West are of vast proportions. To properly finance these projects there must be unbounded confidence among the public at large.

It is high time, then, that state-wide research be used to ascertain the proper relationship of all the factors that enter into these issues, which are of such gigantic magnitude.

PERSONALS

John B. Miller, president of the Southern California Edison Company, is at New York City.

Tully R. Cornick, contracting engineer from Seattle, is a recent business visitor at San Francisco.

J. C. Hobrecht, electrical contractor of Sacramento, was a recent business visitor at San Francisco.

H. J. Snow, Marshfield Electric Company, Marshfield, Ore., was a recent business visitor at San Francisco.

W. E. Hayes, of the Hayes-Van Fleet Electric Company of Santa Rosa, was a recent visitor at San Francisco.

H. A. Lemmen, commercial manager Reno Power, Light & Water Company, was at San Francisco during the past week.

Ross B. Mateer, commercial agent for the Southern Sierras Power Company, was at Los Angeles last week from Riverside.

R. B. Searight, with the Allis-Chalmers Company of San Francisco, is making an extended trip throughout Northern California.

T. W. Simpson, vice-president Federal Sign System (Electric), is making a ten days' trip throughout the San Joaquin Valley and Southern California.

T. E. Bibbins, president of the Pacific States Electric Company, is expected to return from a short business trip throughout the East about the 20th of the month.

E. M. Fiorence, district manager of the Pacific Gas & Electric Company, at Redwood City, recently gave an annual dinner for the employes of that company in his district.

F. H. Gasaway, owner and manufacturer of the Universal Curb Lighting System of Oakland, has recently closed a contract to supply the city of Los Angeles with these curb lights.

E. Kramer, electric range salesman for the Westinghouse Electric & Manufacturing Company, who has been in charge of the company's exhibit at the Stockton show, has returned to San Francisco.

W. R. Lyall, representative of the D. & W. Fuse Company of San Francisco, who is now campaigning throughout Texas, sends his best regards to the electrical fraternity on the Coast.

R. G. Kendrick, formerly manager of the Kendrick Electric Company of Seattle, is a recent business visitor at San Francisco, and is contemplating opening a new jobbing house in the Northwest.

John A. Britton, general manager of the Pacific Gas & Electric Company, who has for the past three weeks been recovering from an operation for appendicitis, has resumed his duties at his office.

W. S. Van Winkle has been elected chairman of the Great Western Power Company, Bay Section, of the National Electric Light Association, **R. H. Sharon**, vice-chairman, and **J. K. Fairchild**, secretary-treasurer.

Earl Fisher of the commercial department of the Pacific Gas & Electric Company, has made extensive arrangements for a big time at the annual jinks held at the Native Sons' Hall, San Francisco, on the 14th for the employes of the P. G. & E.

P. M. Downing, hydroelectric engineer of the Pacific Gas & Electric Company, recently returned from a tour of inspection of the J. H. Wise Power House, South Yuba No. 5, which will be completed and tied into the main system about the first of the year.

Dr. Eiyi Aoyagi, professor of Kyoto Imperial University of Kyoto, Japan, who has been for the past three months traveling throughout Europe and the far East, and has just completed his tour of inspection of the United States on hydroelecric development, expects to leave for Japan shortly.

E. E. Brown was recently elected president of the San Francisco section of the California Association of Electrical Contractors, **C. B. Kenny**, vice-president; **C. L. Chamblin**, secretary; **D. W. Kohlwey**, treasurer, and the members of the executive committee are **Geo. Sittman, H. C. Reed** and **T. Bennett.**

MEETING NOTICES.

Joint Luncheon of Portland Sections of N.E.L.A. and A.I.E.E. with the Oregon Society of Engineers.

The fourth bi-weekly luncheon of the Joint Local Sections of the A. I. E. E., N. E. L. A. and the Oregon Society of Engineers was held Wednesday noon, December 6, in the orange room of the Oregon Hotel, Portland, Ore.

A. C. Brill of the Pacific Telephone & Telegraph Company presided as chairman and J. H. Corcoran, division superintendent of traffic for the telephone company spoke on "The Telephone Girl at Her Work." The meeting was under the auspices of the Pacific Telephone & Telegraph Company and had an attendance of fifty-three.

At the luncheon December 20th, Judge C. U. Gantenbein, judge circuit court, department No. 6, Multnomah county, will speak on the "New National Defense Law." The luncheon will be under the auspices of the Oregon Society of Engineers.

Joint Meeting of Portland N. E. L. A. and A. I. E. E. Sections

The regular monthly meeting of the Joint Local Sections of the N. E. L. A. and A. I. E. E. was held in the Auditorium of the Y. M. C. A. Building, Portland, Oregon, Tuesday evening, December 5th. W. E. Montrose of the Pacific Telephone & Telegraph Company read a paper on the "Construction of Outside Telephone Exchanges." This paper will be published in full at a later date.

The discussion was entered into by Messrs. Brill, Pollock, Whitmore, Broill, Weber, New and Prebstell.

It was announced that on January 9th W. J. Davis, Jr., Pacific Coast engineer for the General Electric Company, will present a paper on the application of "Steam Turbines with Reduction Gearing to Ship Propulsion." This will be illustrated by lantern slides and moving pictures.

The March meeting will be an address by Prof. Morgan of Reed College, who will talk on the "New Chemical Element Electricity."

The discussion of Mr. Montrose's paper brought out that in Oregon alone there is $200,000 to $500,000 expended annually for outside exchanges and also that all wire has been standardized for outside work to No. 12 B. & S. gage hard drawn copper and No. 8 B. W. G. steel wire. For the sleet conditions around Portland the telephone company is now installing extra heavy construction.

Jovian Rejuvenation at Los Angeles.

An especially successful rejuvenation of the Jovian Order was conducted at the Elks' Club, Los Angeles, on December 8th by Tribune Harry N. Sessions. This success was contributed to by the large class of candidates, sixty-one in all, the fine dinner and entertainment preceding the rejuvenation and the excellent rendition of the ritual. Great credit is due Tribune Sessions for his great energy in personally securing members during a three weeks' whirlwind campaign preceding the rejuvenation. In this work he was ably assisted by Messrs. Peters and Pearson of the Southern California Edison Company.

Nearly two hundred Jovians sat down to the sumptuous repast preceding the rejuvenation. Tribune Sessions was given a tremendous ovation on his arrival as was likewise Toastmaster A. E. Morphy. Some startling features in the musical and dancing program of entertainment added greatly to the hilarity of the occasion. Brief remarks were made by Ira J. Francis, the father of the electrical business in Los

Angeles, Ernest Ingle for the candidates, G. B. McLean of the Pacific Light & Power Corporation and B. F. Pearson of the Southern California Edison Company.

After dinner the crowd adjourned to the lodge room where sixty-one electrical members were duly initiated into the mysteries of Jovianism. The degree team was as follows:

E. L. Lewis, Jupiter.
Ralph Clapp, Neptune.
C. E. Cayot, Vulcan.
Z. H. Sherart, Pluto.
C. L. Spring, Mars.
J. M. Morris, Apollo.
H. H. Fogwell, Hercules.
F. B. Nightingale, Avrenim.

Imps—
J. G. Monahan,
E. B. Clay,
T. C. Carr,
G. T. Kirkpatrick,
F. G. Lasher,
J. S. Addis.

The following candidates were initiated:

Armstrong, Clarence M., The Megerberg Co.
Aylesworth, Robt. Dyer, Aylesworth Electric Co.
Anderson, Frank Edward, Pacific Light & Power Corp.
Bishop, Gilbert Haven, Southern California Edison Co.
Booth, Willis H., Hotpoint Electric Heating Co.
Baruch, Milton, Llewellyn Iron Works.
Buttress, Howard P., Buttress & McClellan.
Brody, Harvey Allen, Southern California Edison Co.
Barton, Geo. Sydney, Baker-Joslyn Co.
Connell, John Francis, Contractor.
Carruthers, Raymond I., Southern California Edison Co.
Cates, Richard Herbert, Southern California Edison Co.
Ducker, Peter H., Southern California Edison Co.
Davis, Fred H., Southern California Edison Co.
Decker, George Edward, Southern California Edison Co.
Dielman, John Henry, Weinstock-Nichols Co.
Decker, Charles William.
Farnham, Charles, Pacific Electric Mfg. Co.
Frampton, Wm. Rex., Southern California Edison Co.
Graef, Wm. P., Pacific Light & Power Corporation.
Holabird, Russell G., R. D. Holabird Co.
Holabird, Harry G., R. D. Holabird Co.
Herb, Rudolph Carl, Pacific States Electric Co.
Harmer, Clarence Joseph, Pacific Light & Power Corporation.
Harris, Ford W., Graham & Harris.
Ingold, Ernest, Electric Equipment Co.
Jones, Fred C., Southern California Edison Co.
Jordan, Wm. Francis, Southern California Edison Co.
Kelley, Arthur R., Valuation Engineer.
Lecklider, Ira Henry, Pacific Light & Power Corporation.
Littell, H. M., Southern California Edison Co.
Martin, Jonas Lewis, Los Angeles Electric Supply Co.
Minner, Philip S., Southern California Edison Co.
McCullough, Wm. J., Southern California Edison Co.
McWhorter, Chas. Leonard, Philadelphia Storage Battery Co.
McElwain, Roy Leighton, Southern California Edison Co.
McFadden, Robt. Clyde, Pacific Light & Power Corporation.
Nittinger, Vernon Edward, Fairbanks-Morse Co.
Pearce, Robt. W., Southern California Edison Co.
Percival, F. H. Southern California Edison Co.
Patterson, Jas. Benjamin, Pacific Sales Corporation.
Pendleton, Chas. Howard, Pacific Sales Corporation.
Raffo, Frank H., Automatic Refrigeration Co.
Reynolds, Del Mar, Pacific Electric Railway Co.
Spring, Harry Edward, W. D. Dunham.
Stanton, Joseph, Southern California Edison Co.
Summers, Harry B., Westinghouse Electric Mfg. Co.
Trott, D. M., Southern California Edison Co.
Todd, Edward W.
Toon, Jack, F. E. Newberry Electric Co.
Trickey, Lawrence Leslie, Southern California Edison Co.
Van den heuvel, Wm., Consulting Engineer.
Waldron, Richard, Jr., Board Fire Underwriters.
Weber, Wm. Edward, Pacific States Electric Co.
Westgate, Chas. Adam, Listenwalter & Gough.
Wright, Gilbert Sol., Wright-Callender Andrews Co.
Weller, Lloyd Elwyn, Listenwalter & Gough.
Wescott Earl C., Pacific Sales Corporation.
Lockwood, Robt., Southern California Edison Co.
A. B. Miller, President Fontana Power Co.

ENGINEERS MONUMENTAL FLOOD-LIGHTING INSTALLATIONS.

The illumination of the Statue of Liberty on a scale commensurate with its importance as America's most famous monument may be regarded as the climax of three years of effort and development in the art of flood-lighting.

Until the advent of the gas-filled mazda lamp about three years ago, flood-lighting was seldom indulged in, being regarded as too much of a luxury for permanent use, even by wealthy building owners.

In the rapid progress of flood-lighting since 1914, which has included the illumination of the Woolworth Tower, New York City, the Panama-Pacific Exposition and now the Statue of Liberty, not to mention scores of smaller though locally important installations, no individual has played a more useful part than a certain modest young engineer of Cleveland, H. Herbert Magdeick. Mr. Magedick was graduated from the University of Wisconsin in the class of 1910, and since then has been connected with the engineering department of the National Lamp Works.

MOTOR GENERATOR SETS FOR KEY ROUTE.

In last week's issue of the Journal it was stated that the Great Western Power Company had installed new turbine generators in their Key Route power house. This should have been three motor gnerator sets, developing 11,000 volts synchronously.

NEW C-H MACHINE TOOL STARTING AND REGULATING CONTROLLER,

In addition to its new automatic type machine tool controllers The Cutler-Hammer Mfg. Co. of Milwaukee has developed a new compact type of drum controller made in

New Type C-H Machine Tool Controller.

standard sizes of 1 to 25 horsepower. These controllers provide speed regulation by inserting resistance in the shunt field circuit, the armature resistance being designed for starting duty only. The maximum speed range that can be provided is 3 to 1.

BOOK REVIEW.

Engineering of Power Plants. By Robert H. Fernald, M.E., A.M.,Ph.D. and George A. Orrok, M.E. Size: 6 in. by 9 in.; 586 pp.; 309 illustrations; cloth binding. Published by McGraw-Hill Book Company of New York City, and for sale by Technical Book Shop, San Francisco. Price $4.00.

The notes from which this book has been compiled have been used for several years in two prominent engineering institutions as a fundamental course in power plants for all senior engineering students, including mechanical, electrical, chemical, civil and mining engineers.

The fundamental points insisted upon throughout are such that the student is brought to a realization of the fact that engineering, although based on exact sciences, is not itself an exact science, hence "common sense" must often displace theory in practical application. The second aim is to give the student some idea of the commercial side of engineering.

The book covers a very broad field in its discussions which are listed in twenty-six separate chapters. The commercial aspects of the steam engine and steam turbine and the internal combustion engine are well handled. Under the treatment of fuels, coal receives a thorough consideration. Fuel oil, however, is not treated to the full extent that engineers of the Pacific Coast should desire. The chapter devoted to hydraulic power is brought down to the last word and is of high practical value. Taken as a whole the work should find a welcome place among that class of books that serve the engine in getting a grasp of power plant engineering as a whole.

NEWS NOTES

FINANCIAL.

LOS ANGELES, CAL.—The comparative income account for the year ended October 30, and for the month of October of the Mt. Whitney Power & Electric Company is as follows:

	1915.	1916.
Gross revenue	$637,275	$690,905
Operation, maintenance and taxes	265,640	289,197
Total net earnings	371,634	401,708
Bond interest	134,589	164 284
Balance	237,045	237,424
Net, times bond interest, 2.4.		
Month of October—		
Gross revenue	$72,354	$69,582
Operation, maintenance and taxes	37,006	23,864
Total net earnings	35,348	45,717
Bond interest	14,935	17,645
Balance	20,413	28,072
Net earnings, times bond interest, 2.6		

OLYMPIA, WASH.—The net income of the Olympia (Wash.) Light & Power Company for the year just ended was $35,748.21. The street cars earned $1,755.33 of this amount and $33,992.88 was earned by the auxiliary system. Gross earnings totaled $74,325.31. Improvements made to the property of the company increased its value from $518,916.75 last year to $522,616.57. Stock of the concern is placed at $165,000, bonded indebtedness $90,000, and the liabilities $51,821.24. The Tumwater plant is valued at $128,469.75, and the power plant lands at $65,364.15. The company paid a dividend of 3 per cent in February and 2.5 per cent in August.

LOS ANGELES, CAL.—Pacific Light & Power Corporation, excluding interest on $2,338,000 six per cent collateral trust gold notes, paid directly by the Southern California Gas Company and any revenue derived from that company, reports gross earnings for October, 1916, of $270,382, as compared with $256,522 for October, 1915, a gain of $13,860, or 5.40 per cent. Operating expenses, maintenance, and taxes at the same time increased $9511, leaving net earnings of $171,775, as compared with $167,426 for October of the preceding year, a gain of $4349, or 2.60 per cent. A decrease in other income of $3765 gave a total income for the month of $176,848, as compared with $176,265 for October, 1915, a gain of $583. Interest charges for the month amounted to $100,759, as compared with $106,645 for the corresponding month of the previous year, a decrease of $5886, or 5.52 per cent, leaving a balance of $76,088, as against $69,620 for October, 1915, a gain of $6468, or 9.20 per cent. For the ten months ended October 31, 1916, gross earnings of the corporation amounted to $2,703,012, as compared with $2,417,657 for the corresponding period of 1915, an increase of $285,355, or 11.80 per cent. At the same time operating expenses, maintenance and taxes for the ten months' period increased $110,848, or 13.76 per cent, leaving net earnings of $1,786,752, as compared with $1,612,245 for the 1915 period, a gain of $174,507, or 10.82 per cent.

ILLUMINATION.

MERCED, CAL.—The city trustees have ordered the placing of electroliers on Court House avenue.

PORTLAND, ORE.—The city auditor has been authorized to advertise for bids for lighting the streets and municipal buildings of the city.

CHICO, CAL.—The new electrolier lighting system, plans of which were drawn by Martin C. Polk, are being considered by the city trustees.

SAN LEANDRO, CAL.—The town board has unanimously decided that the electroliers installed in connection with the new electric lighting system should be marbelite.

SANTA BARBARA, CAL.—The city council has instructed the city engineer to prepare plans and specifications for metal standards for the lighting system on State street.

MERCED, CAL.—The plans for the new ornamental lighting system, which were drawn by Charles T. Phillips, of San Francisco, have been approved by the city trustees.

EUREKA, CAL.—The Eureka Electric Lighting Company has applied for an electric lighting franchise in this city, the application being accompanied by a petition from certain taxpayers.

SEATTLE, WASH.—The Seattle & Rainier Valley Railway Company will build a single track line on Genesee street from Rainier avenue to Fiftieth avenue South. The cost will approximate $100,000.

ORANGE, CAL.—The board of supervisors has directed the clerk of the board to advertise for the sale of the franchise applied for by the San Diego Consolidated Gas & Electric Company, bids to be opened January 3, 1917.

LOS ANGELES, CAL.—Notice of the sale of a franchise for the gas pipe lines under the application of the Southern California Gas Company, has been referred to the county counsel for revision by the board of supervisors.

LOS ANGELES, CAL.—The installation of electric work in the new Los Angeles County Hospital buildings will be done by the Southern California Electric Company, the contract having been awarded to that company for $33,720.

LOS ANGELES, CAL.—It is reported by the Athens Improvement Association that an election for the formation of the Athens Lighting District has been carried. The city is now drafting notices of intention for the city's share of the work.

CLE ELUM, WASH.—The bonds authorized by the city of South Cle Elum at the special election held some time ago to prepare for a municipally owned lighting plant were sold to the state of Washington at par ($5000) to draw interest at 5¼ per cent.

LOS ANGELES, CAL.—Steps looking toward the condemnation before the State Railroad Commission of the gas plant of the Los Angeles Gas & Electric Corporation, that the city may establish a municipally owned and operated gas plant, have been authorized by the Mayor.

SAN BERNARDINO, CAL.—C. W. Hickock of Riverside, chairman of the joint committee appointed from the valley cities to further the movement to obtain natural gas, has called a meeting at which plans to promote the proposition will be discussed and future action decided upon.

EUREKA, CAL.—A new street lighting system for the city of Eureka, proposed by Manager Jackman of the Western States Gas & Electric Company, is meeting with the approval of business men and merchants. Negotiations are now in progress with the city officials to bring about its installation.

LOS ANGELES, CAL.—J. L. Wilson has been awarded by the board of public works the contract for installing ornamental posts and appliances for the lighting of West Adams street between Grand avenue and Figueroa street, on a bid of $3565. Proceedings are to be started for ornamental lighting of Genesee avenue between Sunset Boulevard and Fountain avenue.

TELEPHONE AND TELEGRAPH.

WINNEMUCCA, NEV.—The Golends Telephone & Power Company has been granted a franchise to extend its lines through Rochester and Lovelock.

SPOKANE, WASH.—Expenditures of $32,000 in telephone betterments in Spokane and the Inland Empire have been authorized by the head officer in San Francisco.

RIVERSIDE, CAL.—An improvement association is being formed by Riverside people who have cabins near Strawberry Peak in the San Bernardino Mountains. It is proposed to install telephone lines.

LORDSBURG, N. M.—There has been granted to the Mountain States Telephone & Telegraph Company the right to construct, operate and maintain a telephone line along the south side of Fourth street.

BEND, ORE.—Farmers will organize a new company to be called the Farmers No. 2, to build a telephone line to run south of Pilot Butte and out to the Stanley-Davenport ranch. The Farmers No. 1 line will come in north of Butte and will serve the Grange Hall section.

FABENS, TEXAS.—Fabens is to have its own private telephone exchange. Permission has been granted by the county commissioners to A. E. Smith to erect necessary poles along required right-of-ways. The work to be done under supervision of the county engineer.

CASA GRANDE, ARIZ.—The Mountain States Telephone & Telegraph Company has applied for a franchise to construct, operate and maintain a telephone system and exchange in the town of Casa Grande. The common council has adopted a resolution ordering the question as to whether or not a franchise shall be granted to be submitted at a special election.

SEATTLE, WASH.—Bids will be received by the bureau of yards and docks, Navy Department, Washington, D. C., T. R. Harris, chief of bureau, until December 18th, for a telephone cable connection between the Pacific Coast torpedo station, Keyport, Wash., and the Puget Sound navy yard, also an electric power transmission line from the Olympic Power Company's pole line to the radio building at the Pacific Coast Torpedo Station.

SAN FRANCISCO, CAL.—George de Souza, traffic manager of the Pacific division of the Marconi Wireless Company, announces the appointment of W. A. Winterbottom as division superintendent in charge of the transpacific and Alaska circuits; T. M. Stephens as marine superintendent of this coast and H. Barth, division engineer. These appointments are the result of the resignation of A. H. Groman, general superintendent and George Jessop of the marine department.

TRANSMISSION.

KLAMATH FALLS, ORE.—Kern Bros. Power Company has requested a franchise, and an election will be held on the question.

VANCOUVER, B. C.—The legislature will be asked to sanction the right of the city to own and operate its light and power plant.

SEDRO WOOLLEY, WASH.—The council turned down the new lighting contract submitted by the Pacific Northwest Traction Co.

LOS ANGELES, CAL.—Bids have been asked for by the Board of Public Service Commission for weatherproof copper cables and wire.

TWIN FALLS, IDAHO.—The Elkoro Mines Company has located a waterpower site near Jarbidge, Nev., for the generation of electric power.

CARPINTERIA, CAL.—A special election may be called to vote on the proposition of issuing bonds for the erection of an electric lighting plant.

SEATTLE, WASH.—The commissioners have awarded a contract for additional lighting fixtures to the Cascade Gas & Electric Fixture Company at $5987.

SAN DIEGO, CAL.—The San Diego Consolidated Gas & Electric Company will install a power line from Cardiff to the Encinitas Copper Company's mine.

CASHMERE, WASH.—Tentative plans for the construction of a municipal hydroelectric plant was outlined at a recent meeting of citizens and officials.

TULAROSA, ARIZ.—It is proposed to install a water works system here. In connection with the water system an electric light plant will also be installed.

CLE ELUM, WASH.—Bonds for the construction of the municipal lighting plant were sold to the state of Washington at par or $5000 with interest at 5¼ per cent.

LOS ANGELES, CAL.—R. H. Manahan, city electrician, has submitted to the Board of Public Works a new ordinance governing the installation and alteration of electric wiring.

SEDRO WOOLLEY, WASH.—The first electric steel furnace in the northwestern part of this state is now in operation in the plant of the Skagit Steel & Iron Works of this city.

LOS ANGELES, CAL.—The board of supervisors has awarded a contract to the city of Glendale for the installation of lights and the furnishing of energy for the Verduge lighting district.

YREKA, CAL.—The California-Oregon Power Company has contracted with the Fruit Growers' Supply Company of this place to furnish power for the latter company's plant at Hilt.

BISBEE, ARIZ.—Electric lights, gas and water mains, will be installed on the new streets being opened up back of Tombstone Canyon, as soon as demand warrants the installation.

ANACORTES, WASH.—To investigate the feasibility of extending light and power lines to Anacortes, A. W. Leonard, president Puget Sound Traction, Light & Power Company, visited here recently.

INDEPENDENCE, CAL.—The Southern Sierras Power Company was the only bidder for the 50-year electric lighting franchise offered for sale this week. The company's bid of $100 was accepted.

VANCOUVER, B. C.—The legislature will be asked to sanction the city's right to own and operate its light and power plant, in opposition to B. C. Electric Railway Company, or any other company.

HUNTSVILLE, UTAH.—The Petersen Electric Light Company has been organized to sell electric light and power to residents here. The capital is $100,000. The incorporators are J. L. Petersen and others.

LIBBY, MONT.—An auxiliary power plant, operated by a crude oil engine, costing about $10,000, entirely separated from present hydroelectric plant, will be installed by the Libby Water Works, Electric Light & Power Company.

WHITE SULPHUR SPRINGS, MONT.—The city council has approved the transfer of the electric franchise to M. Hoover, of Saco, who proposes to take over the plant and make extensions and improvements to the system.

SAN FRANCISCO, CAL.—The Northern California Power Company has applied to the State Railroad Commission for permission to make use of a franchise granted by Yolo County to extend its power line from College City to Dunnigan.

FALLBROOK, CAL.—It is reported here that a light and power line will be run up San Luis Rey to Canfield and Monserrate ranch, and the line may be extended through to Pala, supplying power and light to various ranches en route.

HORNBROOK, CAL.—The Northern California Power Company now has under construction a dam across the Klam-

ath River near this place. Two generators, with a capacity of 12,500 h.p. each, will be installed in the power plant.

SPOKANE, WASH.—The Spokane Heat, Light & Power Company will open salesrooms and offices in the new building on South Post street the first of the year. The present plant is of 10,000 h.p. capacity and will ultimately be extended to 30,000 h.p.

SEATTLE, WASH.—The American Nitrogen Products Company, C. F. Graff, Securities Building, president, are erecting the first unit of a $500,000 nitrogen plant at La Grande, Wash. The contract for power has been signed with the Tacoma municipal plant.

CASHMERE, WASH.—Arthur Gunn, president of the Wenatchee Valley Gas & Electric Company, has offered to submit to the city council a proposal for furnishing electric service here. It is possible that bonds will be issued for the erection of a municipal electric lighting plant.

KLAMATH FALLS, ORE.—By a vote of 566 to 122 at a special election here recently the voters of Klamath Falls declared in favor of allowing the Keno Power Company of Keno, Cal., to distribute light and power throughout the city in competition with the California-Oregon Power Company.

RITZVILLE, WASH.—Bids are being received by the council of Ritzville, Wm. M. W. Anthony, clerk, for rewiring the light and power circuits at Pump Station No. 1, including the establishment of a marble switchboard equipped with electrical apparatus, according to plans on file with the city clerk.

SEATTLE, WASH.—The construction of a steam electric plant adjoining the site of the existing plant on Lake Union to cost about $390,000 was assured by the council's passage of the ordinance providing for the extension authorizing a utility bond issue not to exceed $390,000. The bonds will be issued in denominations of $100 or $1000.

SEATTLE, WASH.—The plant of the Electric Heating & Manufacturing Company, makers of Apfels electric insert water heaters, radiators and other appliances, at 1812 Ninth avenue, South, was damaged in a recent fire. Work is to be resumed as rapidly as possible, and aside from the inconvenience no handicap was caused.

POCATELLO, IDAHO.—The Gem Irrigation Company of Owyhee County has asked the State Land Board to authorize a contract between the state of Idaho and the irrigation district for the construction of a $300,000 power plant at the Arrow Rock Dam for furnishing the Gem district with electricity for pumping purposes. John C. Rice represents the irrigation district.

SAN DIEGO, CAL.—Transmission lines connecting the distribution system at Oceanside, California, has been completed by the San Diego Consolidated Gas & Electric Company and the power plant at Oceanside will be shut down. The regular rates of the San Diego Consolidated Gas & Electric Company materially reduce the cost of electricity for consumers in Oceanside, and are effective as of November 30.

SEATTLE, WASH.—It is reported on good authority that the Great Northern Railway Company is contemplating turning over its water power sites in this state, particularly that at Lake Chelan, to the Montana Power Company, Butte, for development in its electrification plans. The Montana Power Company furnishes the power for the 400 miles of the C. M. & P. S. Railway Company, electric road through Montana. The development of the Chelan site has been estimated to cost $2,000,000.

SEATTLE, WASH.—The purchase of the Illes Hydro-electric Company of Valdez, Alaska, by the Prince William Sound Water, Power, Light & Telephone Company, a Seattle corporation, for approximately $100,000, ends a water war which has disturbed the residents of that district for nearly four years. The Prince William Sound Company, organized in December last, was virtually a consolidation of the old Alaska Water, Light & Telephone Company, and the Valdez Electric Company, the former of which, it is reported, for six years, paid an annual dividend of 12 per cent, and during all of which time it leased its water power from the Illes plant.

TRANSPORTATION.

SAN FRANCISCO, CAL.—By the decision of Judge Sturtevant in giving Mrs. Celia Kahn judgment against E. R. Lilienthal for $5000 as an indorser of the Northern Electric notes, impetus has been given to the efforts for an acceptable reorganization plan. A tentative plan which is being discussed is the reorganization of the concern on the basis of a ratio of five to one between the owners of underlying and overlying securities. With a readjustment of the debts of the several companies it is planned to effect a merger with one of the big electric railroads.

LOS ANGELES, CAL.—Instead of traveling over the old route, the Pasadena Short Line trains and the Oak Knoll trains now travel south only on Main street. The return trips are made along the elevated tracks to San Pedro street, and then North to Aliso street. Trains for Alhambra, Sierra Madre, Sierra Vista are using the westbound loop. These loops are to be used by incoming and outbound trains only during the period it takes to complete the elevated system. When the elevated tracks have been finished they will be used exclusively, and trains will cease running on the busiest downtown streets.

IRRIGATION.

PHOENIX, ARIZ.—The board of supervisors has granted to residents of Queen Creek a distributing right, in order that this community might bond for $300,000, with which to carry on extensive agricultural improvement work. The money is to be expended for irrigation purposes.

MERCED, CAL.—The Crocker-Huffman Land & Water Company has just completed the seeding of 600 acres beyond Bradley Addition, in the vicinity of Lake Yosemite, to alfalfa. At a cost of $55 an acre, this work represents the expenditure of $33,000, and brings up the company's acreage of alfalfa tracts to 3000 acres.

COLUSA, CAL.—The Cheney Slough Irrigation Company has awarded the contract for making improvements on their property to W. C. Blean. Work will proceed at once on the erection of a pump house sufficiently large to accommodate three powerful pumps. To the two big pumps already installed, one 26 in. and another 36 in., will be added still another 26 in. pump.

OAKDALE, CAL.—Work has been started by the South San Joaquin irrigation district in rebuilding what is known as the Hilts Sag flume, one of the biggest flumes in the state and over 3300 ft. long. The plan is to replace this flume, which carries practically the entire stream of water used for irrigating 70,000 acres, with a concrete structure which, when completed, will cost approximately $150,000.

FRESNO, CAL.—Extensive irrigation activities are going on about 15 miles southwest of Mendota, and about 45 miles west of Fresno at the mouth of Panoche Creek. On the C. D. Hillman tract a dam is being erected across the bed of the creek, to hold enough water to irrigate several thousand acres. Water is already flowing in the irrigation canal for a tract of 6720 acres. The earth dam is to be only temporary. A site has been located in the foothills for a concrete dam, to conserve all the waters of the Panoche. This dam is to cost $40,000 to $50,000, and will store water to irrigate 10,000 to 20,000 acres it is reported.